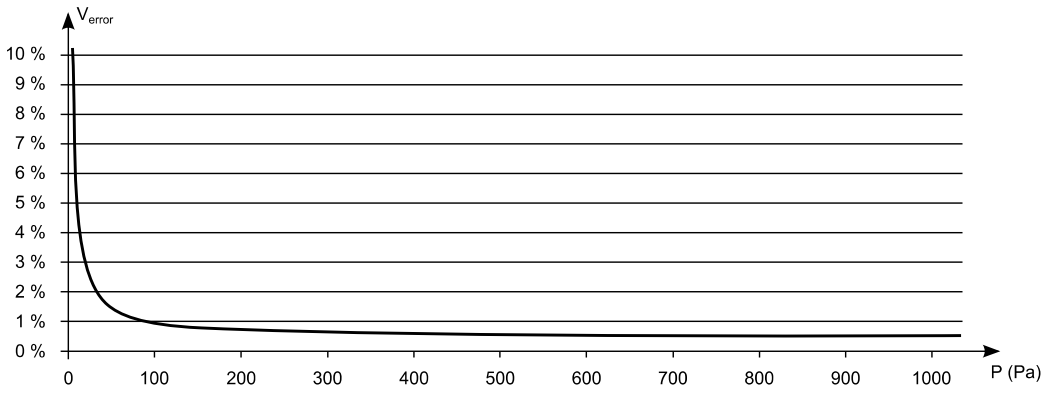
This user guide is for devices with the software version 1.0.12 or newer.

AIR VOLUME MEASURING

The air volume can be measured from:

1. Fans with flow measuring joints.
2. Using traditional air flow sensors like pitot tube, PP air flow probe or iris damper in the ventilation duct.

The flow measurement accuracy changes according to the measured pressure difference (see the following figure). The measurement inaccuracy is V_{error} (25 °C) + error of the probe.



To ensure reliable result, the measurement should be arranged so that the measured pressure difference is at least 15 Pa.

With PP probes, the adequate pressure difference is achieved when the air velocity is over 5 m/s.

With iris damper, the pressure difference can be calculated by using the formula

$$\Delta P = \left(\frac{Q}{k}\right)^2$$, where

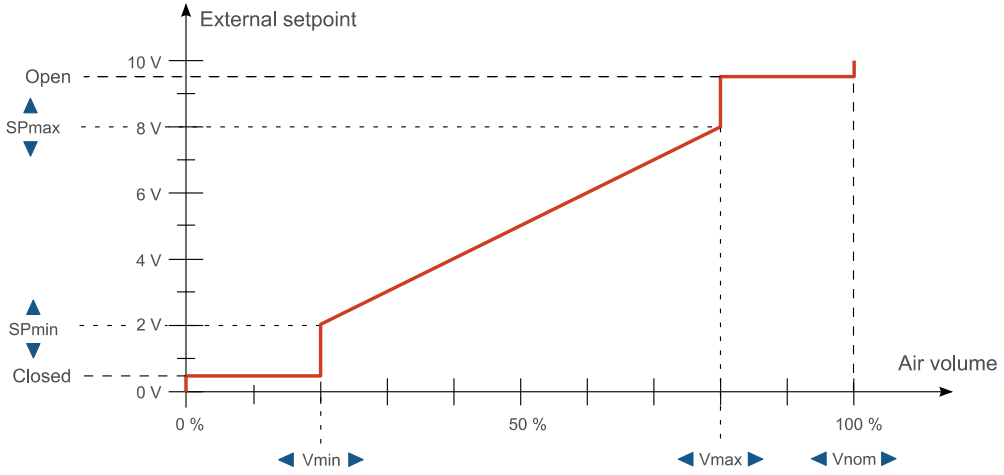
Q = smallest designed air flow and k = iris damper k value.

AIR VOLUME CONTROL

Air volumes are regulated by 0...10 V controlled dampers.

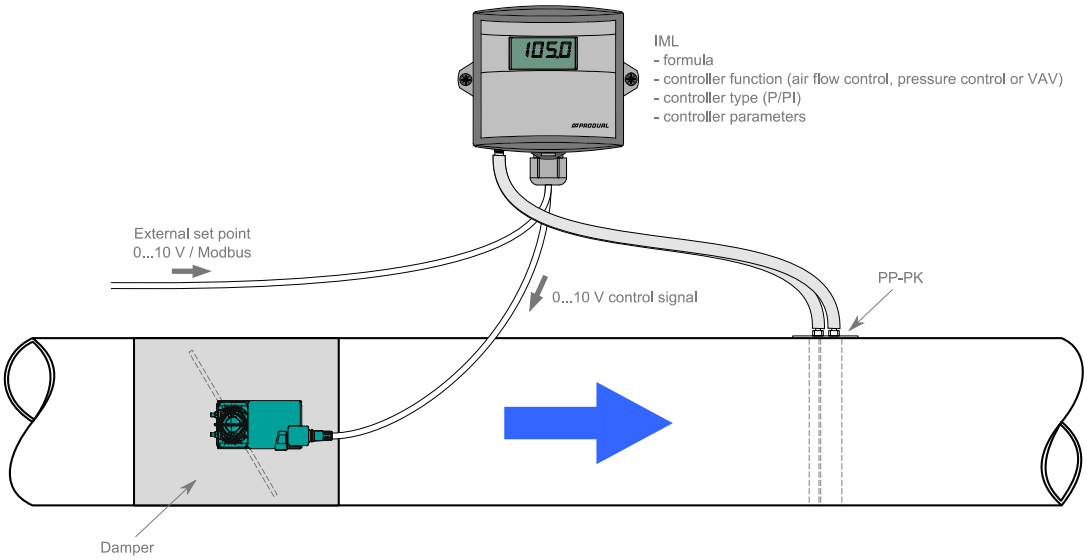
Parameters to be set:

- Defined maximum volume (= nominal volume) Vnom (Vnom = Out1 max)
- Vmin and corresponding SPmin control signal (percents from Vnom value)
- Vmax and corresponding SPmax control signal (percents from Vnom value)



External set point < 0,3 V always CLOSES the damper
External set point > 9,7 V always OPENS the damper (air volume = Vnom)

Example application (supply/exhaust VAV control):



WIRING

Caution

Device wiring and commissioning can only be carried out by qualified professionals. Always make the wirings while the power is switched off.

1	24 Vac/dc
2	0 V
3	Output 1: Air volume, 0...10 Vdc
4	Output 2: Differential pressure or controller output, 0...10 Vdc
5	Input 1: External set point, 0...10 Vdc
6	RS-485 A+ (Modbus, IML-M)
7	RS-485 B- (Modbus, IML-M)
8	RS-485 GND (Modbus, IML-M)

COMMISSIONING

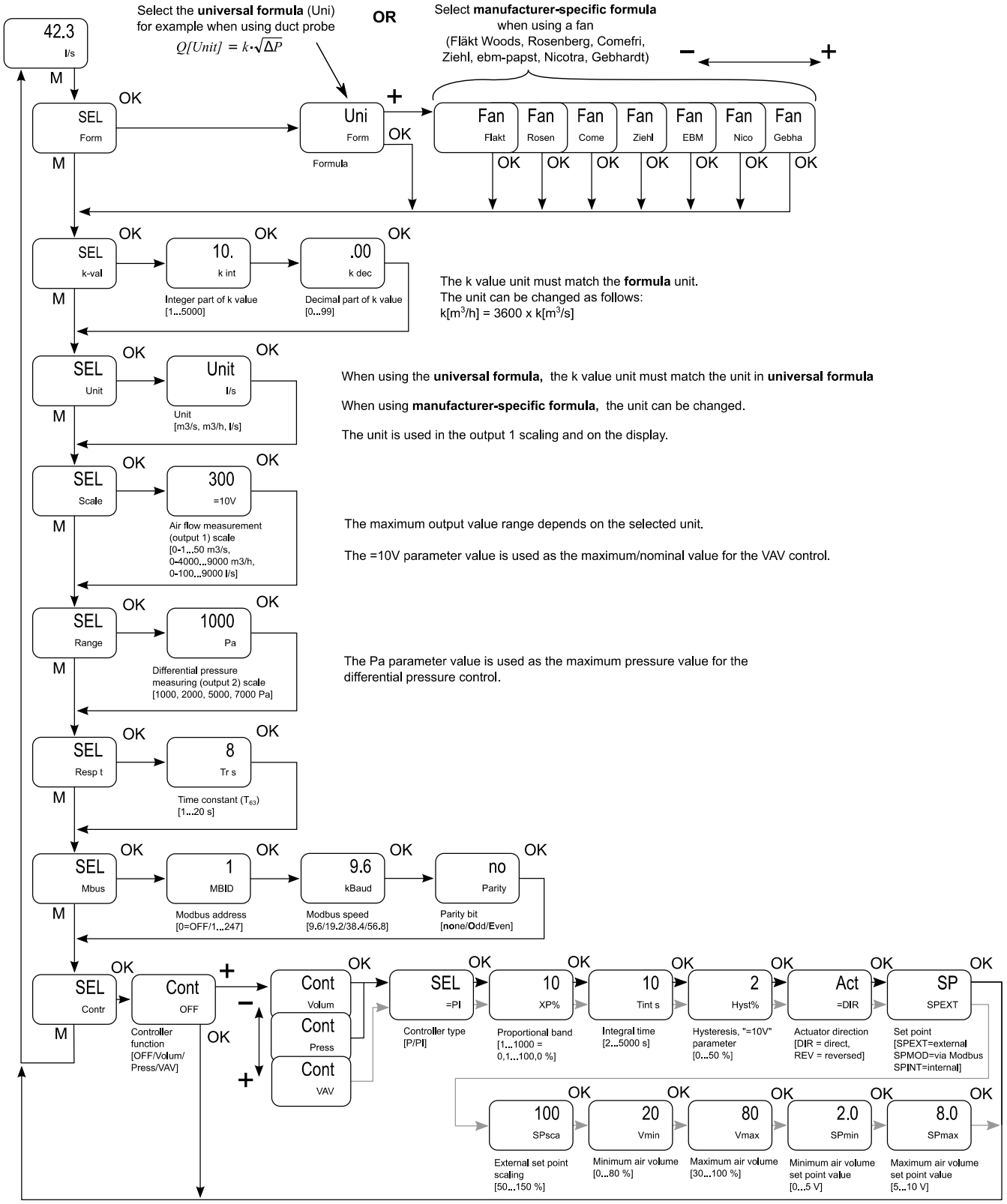
NOTE: All the settings and parameters must be checked during the commissioning. This way you can ensure the correct function in the selected application.

The settings can be configured through the device menu.

MENU

You can proceed in the menu by touching the M and OK buttons. The values can be changed with the ”+” and ”-” buttons. The setting is confirmed with the OK button. The following menu structure contains the factory settings. The settings are saved when exiting the menu.

The device returns to the user mode from the main menu, if the buttons are not pressed within 30 seconds.


42.3
l/s
M
Select the universal formula (Uni) for example when using duct probe
$Q[Unit] = k \cdot \sqrt{\Delta P}$
OR
Select manufacturer-specific formula when using a fan
(Fläkt Woods, Rosenberg, Comefri, Ziehl, ebm-papst, Nicotra, Gebhardt)
SEL Form
Uni Form
Formula
Fan Flakt
Fan Rosen
Fan Come
Fan Ziehl
Fan EBM
Fan Nico
Fan Gebha
SEL k-val
10. k int
Integer part of k value [1...5000]
.00 k dec
Decimal part of k value [0...99]
The k value unit must match the formula unit.
The unit can be changed as follows:
k[m3/h] = 3600 x k[m3/s]
SEL Unit
Unit l/s
Unit [m3/s, m3/h, l/s]
When using the universal formula, the k value unit must match the unit in universal formula
When using manufacturer-specific formula, the unit can be changed.
The unit is used in the output 1 scaling and on the display.
SEL Scale
300 =10V
Air flow measurement (output 1) scale [0-1...50 m3/s, 0-4000...9000 m3/h, 0-100...9000 l/s]
The maximum output value range depends on the selected unit.
The =10V parameter value is used as the maximum/nominal value for the VAV control.
SEL Range
1000 Pa
Differential pressure measuring (output 2) scale [1000, 2000, 5000, 7000 Pa]
The Pa parameter value is used as the maximum pressure value for the differential pressure control.
SEL Resp t
8 Tr s
Time constant (T63) [1...20 s]
SEL Mbus
1 MBID
Modbus address [0=OFF/1...247]
9.6 kBaud
Modbus speed [9.6/19.2/38.4/56.8]
no Parity
Parity bit [none/Odd/Even]
SEL Contr
Cont OFF
Controller function [OFF/Volum/Press/VAV]
Cont Volum
Cont Press
Cont VAV
SEL =PI
Controller type [P/PI]
10 XP%
Proportional band [1...1000 = 0,1...100,0 %]
10 Tint s
Integral time [2...5000 s]
2 Hyst%
Hysteresis, "=10V" parameter [0...50 %]
Act =DIR
Actuator direction [DIR = direct, REV = reversed]
SP SPEXT
Set point [SPEXT=external SPMOD=via Modbus SPINT=internal]
100 SPsca
External set point scaling [50...150 %]
20 Vmin
Minimum air volume [0...80 %]
80 Vmax
Maximum air volume [30...100 %]
2.0 SPmin
Minimum air volume set point value [0...5 V]
8.0 SPmax
Maximum air volume set point value [5...10 V]

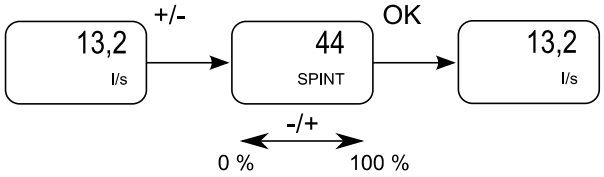
USER MODE

As a default, the air volume and differential pressure view scrolls on the display in turns of three seconds. Air volume unit can be selected with the Unit parameter.

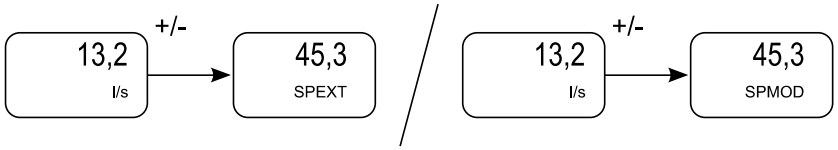
The air volume or differential pressure view can be selected to view continuously by pressing OK button. You resume to the scrolling view by pressing the OK button again.

Set point

The internal set point can be set with the ”+” and ”-” buttons. The set point is given as percentage of the selected range (parameters =10V (flow control) and Pa (pressure control)). The setting is confirmed with the OK button.



If external set point or set point via Modbus is selected (SP parameter is SPEXT or SPMOD), the effective set point can be viewed by pressing the ”+” or ”-” button. The set point is displayed as percentage of the selected range.



RESETTING TO THE FACTORY SETTINGS

The device can be reset to the factory settings by simultaneously pressing the ‘M’, ‘+’ and ‘OK’ buttons for 5 seconds. The device must be in the user mode when resetting the settings.

MODBUS

The parameter memory durability allows at least 100 000 writing cycles.

Bus properties

Protocol	RS-485 Modbus RTU
Bus speed	9600/19200/38400/56800 bit/s
Data bits	8
Parity	none/odd/even
Stop bits	1
Network size	up to 247 devices per segment

Modbus function codes

The device supports the following Modbus function codes.

0x01	Read coils
0x02	Read discrete inputs
0x03	Read holding registers
0x04	Read input registers
0x05	Write single coil
0x06	Write single register
0x0F	Write multiple coils
0x10	Write multiple registers
0x17	Read/write multiple registers

Modbus registers

Coils

Register	Parameter Description	Data Type	Value	Range	Default
1	Control mode	Bit	0 - 1	0 = P 1 = PI	0
2	Actuator direction	Bit	0 - 1	0 = Direct 1 = Reversed	0
3	Output 1 Modbus over drive enable	Bit	0 - 1	0 = Off, 1 = On	0
4	Output 2 Modbus over drive enable	Bit	0 - 1	0 = Off, 1 = On	0

Input registers

Register	Parameter Description	Data Type	Value	Range
3000**1**	Pressure	Signed 16	0...7000	0...7000 Pa
3000**2**	Flow, selected unit m^3/s	Signed 16	0…500	0,0…50,0 m^3/s
	Flow, selected unit m^3/h	Signed 16	0…9000	0…9000 m^3/h
	Flow, selected unit l/s	Signed 16	0…9000	0…9000 l/s
3000**3**	External set point (0...10V)	Signed 16	0...100	0...10,0 V
3000**4**	Internal set point	Signed 16	0...100	0...100 %

Holding registers

Register	Parameter Description	Data Type	Value	Range	Default
4000**1**	Formula	Signed 16	0 - 1 - 2 - 3 -4 - 6 - 7	0 = Uniform 1 = Fläkt Woods 2 = Rosenberg 3 = Comefri 4 = Ziehl 5 = ebm-papst 6 = Nicotra 7 = Gebhardt	0
4000**2**	k-value integer	Signed 16	0...5000	0...5000	10
4000**3**	k-value decimal	Signed 16	0...99	0,0…0,99	0
4000**4**	Unit	Signed 16	0 - 1 - 2	0 = m^3/s 1 = m^3/h 2 = l/s	2

Register	Parameter Description	Data Type	Value	Range	Default
4000**5**	Out 1 scale, Vnom (unit above)	Signed 16	1...9000	1…9000	300
4000**6**	Pressure measurement range	Signed 16	0 - 1 - 2 - 3	0 = 1000 Pa 1 = 2000 Pa 2 = 5000 Pa 3 = 7000 Pa	0
4000**7**	Response time (T_{63})	Signed 16	1...20	1...20 s	8
4000**8**	Controller	Signed 16	0 - 1 - 2 - 3	0 = Off 1 = Volume 2 = Pressure 3 = VAV	0
4000**9**	Proportional band (Xp)	Signed 16	1…1000	0,1...100,0 %	10
400**10**	Integral time	Signed 16	2…5000	2…5000 s	10
400**11**	Set point	Signed 16	0 - 1 - 2	0 = ext. 0…10 V 1 = Modbus 2 = Internal (menu)	0
400**12**	Modbus set point *)	Signed 16	0...1000	0...100,0 %	0
400**13**	External set point scale (effective if 40008 = 3 VAV)	Signed 16	50...150	50...150 %	100
400**14**	Vmin (effective if 40008 = 3 VAV)	Signed 16	0...80	0...80 %	20
400**15**	Vmax (effective if 40008 = 3 VAV)	Signed 16	30...100	30...100 %	80
400**16**	Spmin (effective if 40008 = 3 VAV)	Signed 16	0...50	0...5,0 V	20
400**17**	Spmax (effective if 40008 = 3 VAV)	Signed 16	50...100	5,0...10,0 V	80
400**18**	Output 1 Modbus over drive *)	Signed 16	0...100	0...10,0 V	0
400**19**	Output 2 Modbus over drive *)	Signed 16	0...100	0...10,0 V	0
400**20**	Hysteresis	Signed 16	0…50	0…50 %	2

*) **NOTE:** Values, set via Modbus, will be lost during a power failure and must be updated after power is back.